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Operations and Services
Hydrologic Services Program, NWSPD 10-9

WEATHER FORECAST OFFICE HYDROLOGIC OPERATIONS

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SUMMARY OF REVISIONS: This directive supersedes NWS Instruction 10-921, dated September 17, 2002. The following revisions were made to this instruction:

(1) Updated reference to directives covering WFO hydrologic products to include NWSI 10-923. Corrected reference to directive on WFO hydrologic reports from NWSI 10-923 to NWSI 10-924.
(2) Improved the layout for the section on hydrologic forecast and warning operations for forecast points so the definitions for small- and large-scale forecast points are clearer.
(3) Added sections highlighting WFO/RFC collaboration on service improvement and outreach efforts for customers and partners.

Signed August 21, 2003
Gregory A. Mandt Date
Director, Office of Climate,
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Weather Forecast Office Hydrologic Operations

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1. Introduction. This directive specifies national instructions for hydrologic operations at NOAA National Weather Service (NWS) weather forecast offices (WFO). Its purpose is to achieve basic operational consistency among all WFOs, while allowing for flexibility in appropriate areas to meet unique customer/partner requirements in each hydrologic service area (HSA). Instructions on content of WFO hydrologic products are contained in NWS Instruction 10-922. This directive covers the operations conducted to produce those products and other services.

2. Staff Operational Responsibilities. Hydrologic operations are a team effort of the WFO staff as described in this section.

2.1 Meteorologist In Charge. The meteorologist in charge (MIC) is ultimately responsible for the quality of WFO hydrologic services. The MIC sometimes represents the WFO hydrology program at media briefings or other high-level meetings with customers and partners, but delegates most program leadership responsibilities to the service hydrologist or hydrology focal point.

2.2 Service Hydrologist. Selected WFOs have a service hydrologist to serve as the hydrology program leader. The service hydrologist reviews customer/partner requirements and makes improvements to WFO hydrologic operations and services to meet those requirements. In coordination with the science and operations officer (SOO), the service hydrologist provides operational training to WFO staff on hydrologic responsibilities such as issuance of river forecasts and flood warnings. He/she performs program leadership tasks requiring in-depth hydrologic expertise. In some cases, a service hydrologist is designated to support the hydrology program for one or more nearby WFOs. This support typically takes the form of advice and administrative support for the hydrology focal point (see section 2.3) at the supported office(s).

As a program leader and member of the WFO operational team, the service hydrologist also works operational shifts, if qualified, up to 20 percent of the annual work hours. Service hydrologists supporting more than one WFO should be assigned lesser operational shift work commensurate with increased workload associated with providing technical leadership for the supported office(s).

2.3 Hydrology Focal Point. Each WFO not having a service hydrologist position designates one of their operational staff to serve as a hydrology focal point. The hydrology focal point serves as the hydrology program manager for the WFO with assistance and support from a service hydrologist at a nearby office. The hydrology focal point addresses most day-to-day hydrology program support issues and coordinates activities requiring in-depth hydrologic expertise with the supporting service hydrologist at the nearby office.

2.4 Meteorological Forecasters. Meteorological forecasters have the primary responsibility for WFO hydrologic operations, including preparation and issuance of event-based flood/flash flood products and scheduled hydrologic forecast products.

2.5 Warning Coordination Meteorologist. The warning coordination meteorologist (WCM) works with the service hydrologist or hydrology focal point to coordinate hydrologic products and related services with customers and partners and educate them about the NWS Hydrologic Services Program. In coordination with the service hydrologist or hydrology focal point, the WCM assesses how well the WFO is prepared to conduct meteorologic and hydrologic operations, with a specific emphasis on the effectiveness of warning applications. The WCM also leads service evaluations and other related activities following extreme hydrologic/hydro-meteorologic events.

2.6 Science and Operations Officer. The SOO, as overall science and training leader of the WFO, works with the local or supporting service hydrologist to conduct hydrologic training for the office staff.

2.7 Hydrometeorological Technician. Hydrometeorological technicians (HMT) have important responsibilities in the WFO hydrology program, including data collection and quality control. They also support administration of the hydrology program. HMTs, under the oversight of a senior forecaster, may also prepare and issue routine hydrologic products, event-driven flood/flash flood products, and related informational products.

3. WFO Hydrologic Functions. WFOs have five primary hydrologic functions - hydrologic forecast and warning operations, hydrology program leadership activities, river forecast center (RFC) support, hydrologic/hydrometeorological network management, and interagency support and forecast exchange. General instructions on execution of these functions are presented in this section.

3.1 Hydrologic Forecast and Warning Operations. WFOs prepare and disseminate forecast and warning products for rivers, streams, and/or areas as part of the integrated operations performed by all forecasters. These products are described in NWS Instructions 10-922 and 10-923. WFOs may produce quantitative precipitation forecasts (QPF) to support their own hydrologic forecast and warning operations.

3.1.1 Areal Hydrologic Warning Operations. WFO forecasters maintain a continuous hydrologic watch over their areas of responsibility, using decision-assistance tools to monitor observed precipitation, near-term QPF, and flash flood guidance. When the potential or likelihood of flooding over an area (e.g., county) is indicated which cannot be indexed or otherwise accounted for in forecasts for specific stream locations, appropriate areal hydrologic watch/warning products are issued for the affected area.

3.1.2 Hydrologic Forecast and Warning Operations for Forecast Points. In maintaining a continuous hydrologic watch, WFO forecasters monitor the situation at stream locations where hydrologic forecasts are obtained from a supporting RFC or a local forecasting procedure. Such forecasts are provided for forecast points where a user requirement has been identified and sufficient real-time data, gaging station rating tables, and other required resources are available. When necessary, WFOs prepare and issue hydrologic forecast and warning products to the public for these points.

WFO hydrologic forecast and warning operations for forecast points are conducted for locations on rivers and streams falling into two general scales: (a) small, fast-rising streams and (b) larger streams which include main-stem rivers. With its associated RFCs and in coordination with the regional headquarters, each WFO maintains a mutually-agreeable list of which forecast points in the HSA fall into the small and large scales. The distinction between small- and large-scale forecast points is of an operational nature as described in (a) and (b) below.

a. **Small-scale forecast points**: To support hydrologic forecast and warning operations for small-scale forecast points, WFOs may use RFC forecast values

and/or output from local site-specific forecast procedures. WFOs and RFCs work together to develop and support these local site-specific forecast procedures and ensure they reasonably simulate observed streamflow values for small-scale forecast points. WFOs may produce, revise, or update hydrologic forecasts and issue forecast and warning products for small-scale forecast points whenever they deem it appropriate.

b. **Large-scale forecast points**: WFO hydrologic operations for large-scale rivers involve incorporation of RFC forecast values into WFO products for which locally-acquired information is added to address impacts to nearby areas. RFC modeling for these rivers requires complex hydrologic operations which account for multiple sub-drainage inputs, multiple upstream tributaries, reservoirs, diversions, and/or channel hydraulics. When issuing a hydrologic forecast or warning product for large-scale forecast points, a WFO may modify the forecast values provided by the supporting RFC. However, modifications are explicitly coordinated with the RFC unless an emergency situation exists such as a communications outage, a rapidly changing event when time does not permit contacting the RFC, or an event occurring when the RFC is closed or otherwise unavailable. During the coordination process, all reasonable effort will be made to arrive at a consensus, but in the unlikely event that agreement on proposed modifications to RFC forecast values cannot be reached, WFO forecasters will use the RFC values in the official forecast.

   If RFC forecast values are unavailable for a large-scale forecast point during an event, a WFO may issue appropriate preliminary forecast or warning products. Such actions should be coordinated with the supporting RFC unless an emergency situation exists as described above.

3.2 Hydrology Program Leadership Activities. Several hydrology program leadership activities are performed by the service hydrologist or hydrology focal point in support of the WFO's hydrologic operations. At offices which do not have a service hydrologist position, some of these functions are divided between the hydrology focal point and the service hydrologist from a nearby WFO with designated support responsibility.

3.2.1 Hydrologic Service Coordination. The service hydrologist or hydrology focal point coordinates WFO hydrologic services and service requirements with associated RFCs, emergency management agencies, other hydrologic customers and partners, and the regional headquarters. Such coordination activities include but are not limited to:

a. Identifying and planning programmatic changes in WFO hydrologic products and services.

b. Determining product and service requirements of customers and partners in the HSA.

c. Evaluating sites and areas subject to floods and flash floods and leading the establishment of new hydrologic services for these locations.

d. Participating in appropriate planning meetings and related flood preparedness activities.

e. Setting requirements for the hydrologic data network.

These coordination activities are performed under the oversight of the MIC and in coordination with the WCM.

3.2.2 Hydrologic Forecast System Support. Several procedure development activities conducted by the service hydrologist or hydrology focal point are required to support the WFO hydrologic forecast system (WHFS). These activities include maintaining the system, troubleshooting problems, establishing the local site-specific forecast procedure for small stream basins, updating hydrologic model parameters, expanding the local dam catalog, adding to flood history information in the hydrologic database, and conducting field work to populate the WHFS database with other location-specific information which can be included in hydrologic products.

3.2.3 Hydrologic Training. The service hydrologist or hydrology focal point provides hydrologic and hydrometeorologic training to operational staff. The goal of this training is for all operational staff to be able to perform hydrologic forecast and warning operations and routine hydrometeorological duties in the WFO. These and other training activities such as administration of nationally-developed teletraining and correspondence courses are coordinated with the SOO and, when appropriate, the supporting RFC.

3.2.4 Hydrologic Reports and Specialized Forecast Products. The service hydrologist or hydrology focal point prepare WFO hydrologic reports as described in NWS Instruction 10-924. They also prepare specialized hydrologic forecast products as needed to meet customer and partner requirements in the HSA. After unusually damaging flood events, the service hydrologist or hydrology focal point serves as the WFO hydrologic expert for service assessments.

3.2.5 Hydrologic Data Network Support. The service hydrologist or hydrology focal point serves as the WFO expert on hydrometeorological networks. When requested, they assist partners in the setting of requirements, design, and implementation of such networks. These include automated local flood warning systems, mesonets, stream gaging networks, and GOES data collection platform networks.

3.3 River Forecast Center Support. In addition to regular coordination of hydrometeorological conditions with supporting RFCs, several operational activities conducted by WFOs support hydrologic modeling and forecast operations at RFCs.

3.3.1 Data Quality Control. WFOs collect and quality control selected sets of hydrometeorological data including precipitation and temperature data from ground-based sensors as well as stage data.

3.3.2 Temperature Forecasts. Routinely produced WFO temperature forecast information may be used by RFCs as input to their snowpack modeling operations.

3.3.3 Forecast Point Information. WFOs provide RFCs with updated forecast point information (metadata) from their hydrologic database, including location (e.g., latitude/longitude), description (e.g, NWS identifier), and flood impact (e.g., flood effects at various stages). This transfer of metadata to the RFCs occurs whenever E-19 or E-19a information is updated in the WFO hydrologic database.

3.3.4 Customer Outreach. As feasible within existing resource limitations, WFOs collaborate with RFCs on efforts to improve hydrologic services to customers and partners. WFOs should coordinate with their supporting RFCs on ideas and proposals for improving hydrologic services to customers and partners.

3.3.5 WFO/RFC Collaboration. WFOs and RFCs should make collaboration and teamwork an intentional activity. Programs, initiatives, and ideas that advance NWS hydrologic services should be identified, recognized, and shared. Each WFO should work with its supporting RFC(s) to develop a hydrologic collaboration plan to increase the sharing of technology and information as well as improve the support for customer and partner education.

3.4 Hydrologic/Hydrometeorological Network Management. Management of the hydrologic/hydrometeorologic network in the WFO area is an essential WFO operation. Guidelines on the service-related aspects of hydrologic/hydrometeorologic networks are contained in NWS Instruction 10-940.

3.5 Interagency Support and Forecast Exchange. WFOs coordinate hydrologic forecast and warning activities with local, state, and regional cooperators and share information as per established agreements.

WFOs maintain working relationships with partners responsible for the management of stream gaging stations such as district offices of the U.S. Geological Survey (USGS). Procedures should be maintained for the transfer of information between agencies, including real-time streamflow measurements and other data, during significant flood events. WFO phone numbers are provided to the cooperators for posting in stream gage houses. WFOs and cooperators should meet periodically to keep informed of each agency's activities and collaborate on hydrologic field work (e.g., surveying high water marks, establishing staff gages) when appropriate.

4. Non-Routine Operations. Certain types of uncommon events may require specialized hydrologic operations as identified in this section.

4.1 Dam Failures. WFOs serve as the point of issuance for public hydrologic products associated with dam failures. Available hydrologic/hydraulic models and catalogs of dam-related information are used in this process as appropriate. WFOs should work with agencies responsible for operating dams to ensure the appropriate NWS offices are included in emergency action plan call lists. WFOs should ensure that their office is the first NWS office to contact in the

emergency action plan call lists. WFOs should also participate in dam failure exercises to maintain operational readiness.

4.2 Hazardous Materials (HAZMAT) Spills. In the event of a HAZMAT discharge into a river, WFOs may be able to provide estimates of travel time with input from RFCs.